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ABSTRACT

This paper describes some applications in which interactive video is being used, demonstrates why it is being used, and proposes some rules to help determine when interactive video should be considered as an instructional delivery system. The document includes background on the development and application of videodisc players in education and training, a list of organizaions currently using interactive video and the subject applications, and a discussion of both generic and specific laserdiscs. Based on a review of current literature, a number of situations when interactive video should be considered as a delivery system are presented: (1) to gather together a large collection of multimedia material such as slides or a mixture of slides and motion sequences on film or video; (2) a large number of learners are distributed over time and place; (3) teachers with subject matter expertise are in short supply; (4) equipment simulation is required; (5) simulation of a potentially dangerous situation is required; (6) the situation requires continuous practice and/or retraining; (7) the subject matter is relatively stable; (8) the training involves the teaching of processes, procedures, problem solving, and decision making; (9) learners vary in experience and/or entry level skills; and (10) there has to be a better way. A 44-item bibliography is included. (THC)

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TITLE

INTERACTIVE VIDEO: WHEN TO CONSIDER ITS USE

By

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Final Paper for

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"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

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ABSTRACT:

This paper describes some of the applications in which Interactive Video is currently being used, attempts to demonstrate why it is being used, and proposes some rules to help determine when Interactive Video should be considered as a delivery system.

BACKGROUND:

The first videodisc player reached the market at the end of 1978 (23). By the end of 1979, at least a dozen organizations were experimenting with its use as an educational device. By mid-1985, 1328 hours of instruction had been developed for the U.S. Army alone. 3263 hours are expected to be developed by mid-1986, and 6378 more hours of training by mid-1987 (39).

The first project started in 1979 was in language learning in the Spanish department of Brigham Young University. Among other organizations participating at this time were the Nebraska Educational Television Network, the Naval Training Equipment Center, Lister Hill National Library of Medicine, the University of Utah, MIT, Hazeltine, Westinghouse, and Control Data (23).

At this time, there are literally hundreds of applications in education and training in which Interactive Video is being applied.

CURRENT APPLICATIONS: A sampling

ORGANIZATION	SUBJECT	REFERENCE
AT&T	Technical training	(3)
American Airlines	727 training simulator	(27)
Bank of America	Bank teller training	(11)
British Government	Income tax simulation	(37)
College of San Mateo	Electronic technician training	(11)
Digital Equip. Corp.	Field service training	(25)
	Management training	(44)
Drew University	Space program/Astronomy	(11)
Embry-Riddle Aeronautical Univ.	Flight training	(11)
FMC	Maint. & repair--Bradley vehicle	(28)
Fla. Dept. of Health	Training of social workers	(27)
Ford Motor Corp.	Training of auto mechanics	(27)
General Electric	Aircraft engine repair	(27)
IBM	Field service training	(11)
	Sales Rep. training	(27)
Intelligent Images Inc.	Training of trauma center personnel	(2)
Interdigital Corp.	Management/Sales Rep. training	(31)
J.C. Penney	Inventory control training	(27)
John Wiley & Sons	Physics	(11)
Lehigh University	Teacher training--how to work with disabled	(11)
Maryland Instr. T.V.	How to start and run a small business	(12)
Minn. Educational Computing Consortium	High school economics	(1)
Monterey Lang. Inst.	Foreign language training	(34)
Nebraska Video Group	Training for the hearing impaired	(30)
	Trial procedures for law students	(22)
	Chemistry	(38)
Open University	Intro. to Eng. materials	(43)
Pool Well Servicing Co.	Training for oil field workers in management, selling skills, administration, finance, and technical skills	(13)
San Francisco State U.	Effective paragraph writing	(40)
Sizzler Restaurants	General skills training	(27)
Travelers Insurance	Computer literacy	(15)
U.S. Army	How to manage the instructional design process	(14)
University College of Cardiff	Zoology	(33)
	Library Research	(33)
Univ. of Arkansas	Secondary school mathematics	(4)
Univ. Calif. Riverside	Lang./reading skills for the deaf	(5)
Univ. Ca. Santa Cruz	Precalculus mathematics	(20)
Univ. of Delaware	Music theory	(42)
Wang	Use of office automation prod.	(9)
West Sussex Inst. of Higher Education	Accounting and budget control	(8)
Xerox Learning Systems	Management training	(31)

DISCUSSION:

The laserdiscs that have been produced for the above applications can be broken into two classes: generic or archival, and specific discs.

A generic disc is one for which a number of applications or training modules may be written.

A specific disc is one which is very tightly coupled to a specific unit of training and the accompanying computer program, making it unlikely that the disc could be used for another unit of training.

Generic discs are archives or collections of still pictures and/or snippets of film or video, such as the Grolier Encyclopedia disc (7), the space archive discs (11), or the social studies discs (11,24). The Sears Roebuck disc, for example, contains 5,600 still frames and 19 motion sequences, which range from 30 seconds to 4 minutes in length. This format should lend itself to many subjects, but the frequency with which it appears in the literature is small when compared to the specific class of disc. A hypothesis might be postulated that the reason is related to the copyright laws.

Specific discs should cost more to produce, since original materials need to be designed, written, and produced as video. Programs need to be written, but this would also be true if a generic disc were used, so that programming costs need to be placed on both sides of the equation.

An interesting study comparing the cost of obtaining permission to use copyrighted material versus the cost of producing original material, could be made.

Be that as it may, there are many cases where original material needs to be produced because:

- Existing material doesn't fit the need, or

- Material doesn't exist.

Why are videodiscs being used in the above applications?

Hon (19) states, "the value of the Videodisc stems from the premise that people should be allowed to control their own learning." Hershberger (18) notes that as a psychological side-effect, "the privacy and concentration required in using the video technology produces a worker who is more independent and work-involved in his or her work environment."

A number of the studies specifically mentioned self-study as a reason for using interactive video (9,13,15,27,38). This would seem to be especially true for the medical profession (1,6). Self-paced instruction can be delivered by methods less expensive to produce than interactive video.

Many of the articles claimed that money was saved (9,13,25,27). One way to save money is by saving time (10,15,25,27). Another way is by using interactive video to simulate equipment that either is too expensive, too large, or otherwise inconvenient to use in the classroom (16,21,26,28,36, 41). Shriver (35) indicates that practice on real equipment takes longer than on simulated equipment. High-fidelity simulators, which cost almost the same as real equipment, are not much of an improvement. Simplified models are preferred.

A training program using a simulator employing interactive video would have a much lower life-cycle cost than a similar program using real equipment.

Interactive video has allowed the State of Minnesota to deliver high school economics in rural schools where there are no qualified teachers in that subject (11). Karwin (7) describes a similar study involving high school mathematics.

Rowe (34) claims that languages should not be taught as other subjects are taught. As children, we don't learn language from books, and as adults, we shouldn't, either.

Nico (28) describes the impossibility of writing traditional training programs to repair equipment for which the written manuals run 12,000 to 80,000 pages.

Mirwin (26) indicates that in the teaching of electronics, show-and-tell is an important part of the instruction and, therefore, interactivity is important. Being able to start, stop, and review training material is desirable in these situations.

These are some of the reasons that developers of training using interactive video have given for their selection of interactive video over other media.

A small number of the articles reviewed for this study have attempted to derive some rules as to when interactive video should be considered as a delivery system. These were Helsegon (17), Ketner (21), Pribble (31), Rowe (34), and Shriver (35).

RULE 1. (17)

To gather together a large collection of multimedia material, such as large slide collections or a mixture of slides and motion sequences on film or video.

When the number of slides becomes large enough, the cost of reproduction and distribution is less if videodisc is used as the means of distribution. For example, the cost of reproduction for 1000 slides would be approximately $500. The cost of making one videodisc is $1800; 2-to-100 discs cost $18, and, in quantities of 1000 or more, the costs drop to $10

each (32). If the assumption is made that the cost of setting up a tape to make the laserdisc is $2000, more than seven sets of slides would cost less if videodisc were to be used. These figures do not include the cost of slide trays, thirteen of which would be required to hold 1000 slides. Film and video cost more than slides to reproduce, improving the cost advantage of videodisc. The cost of a laserdisc player and enough monitors to equip a classroom would need to be compared to the cost of a slide projector, motion picture, and videocassette player.

RULE 2. (17,31)

There are a large number of learners distributed over time and place. In this situation, the major trade-off is between self-paced training and lecture-based training, and the cost of each delivery system. The break-point is reached when it is more economical to use self-paced training rather than lecture. The next trade-off point comes when media is to be selected, in which case rule 1 applies.

RULE 3. (31)

Teachers with subject matter expertise are in short supply. This rule is illustrated by the economics course developed by the State of Minnesota (12) because of the shortage of qualified teachers in the rural schools, or by the precalculus math project being developed by the University of Santa Cruz, Calif., (20) because of the shortage of math teachers. Does the situation require that students be moved to be matched with teachers or teachers be moved to be matched with students? If either of these situations is the case, consider rule 2.

RULE 4. (21,35)

Simulation of equipment is required.

This rule can be applied when:

1. Real equipment is too heavy to move into the classroom.
2. Real equipment is too big to be moved into the classroom.
3. Real equipment is too expensive to use in the classroom.
4. Real equipment is too delicate for student use.
5. Real equipment is not available.

In these cases, use previous rules to determine if interactive video is the proper solution.

RULE 5. (3)

Simulation of a potentially dangerous situation is required.

This could occur in a high school chemistry class or in training workers to repair nuclear power plants. In a simulation, dangerous adverse consequences can be shown.

RULE 6. (17)

The situation requires continuous practice and/or retraining.

This is best illustrated by pilot training. Pilots need to be able to demonstrate near-perfect proficiency before being allowed to use real equipment.

RULE 7. (31)

The subject matter is stable or relatively stable.

Some subject matter doesn't change, such as basic mathematics or science. Some subjects may change over a period of time, such as biology. In these

cases, the cost of delivery over the life-time of the subject matter is very high when compared to the cost of development. If the use of interactive video reduces the cost of delivery, it should be considered.

RULE 8. (17)

The training involves the teaching of processes, procedures, problem solving, and decision making.

Simulation can be used to teach these higher level skills. In industry these skills are often taught "on-the-job." An investigation would have to be made in order to determine if formal training would save money in terms of increased production, because the trainees might be brought "up-to-speed" faster, and trained workers would not be tied down training unskilled workers.

RULE 9. (17,31)

The learners vary in experience and/or entry level skills.

This is true in most training situations; however, very few programs have been designed with specific features built in to handle different levels of learners. None were found in the literature search made for this study.

A variation of this theme is when the design contains different sets of examples designed to appeal to different interests on the part of the students.

It is the observation of the author that a great deal of discussion takes place in the literature about the desirability of such features, but they have yet to be implemented.

RULE 10. (34)

There has to be a better way.

Rowe (34) claims that language training should not be done by way of books. No one learns his or her first language in this manner. Why should they learn their second language differently?

The use of any of these rules will require that an economic analysis be undertaken in order to demonstrate that the use of interactive video should be considered.

CONCLUSION:

During the last eight years, the number of units of educational instruction employing interactive video has increased greatly. The range of subject matter of these educational projects is very broad. General rules have been developed that describe situations in which the use of interactive video should be considered. The most convincing rules are those that point to an economic justification for employing interactive video rather than some other media or combination of media.

Interactive video is a means by which large amounts of mixed media such as slides, film, and video may be combined and distributed. The pedagogical reasons for the use of media have been given in literature other than this paper.

The laserdisc makes it easier for the designer of instructional materials to build interactivity into course materials.

As with many decisions, the decision to employ interactive video will be made on economic grounds.

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